S*s*, and about the fixed point P', that if the pencil tube Q were clamped to L'T', instead of having a certain sliding motion along it, the resulting curve would be the superior branch of the conchoid, as Qr.

It is curious to observe, that by thus adding an additional member, and thereby somewhat complicating the instrument attributed to Nicomedes, we produce a curve of greater mathematical simplicity than the curve called after that geometer, for a line of the second order is produced, instead of one of the fourth.

Again, if a socket be provided at the extremity of the radial bar at T', and fitted on to the point L', an exactly analogous modification of the inferior branch of the conchoid, will produce the hyperbola, and this is sometimes the preferable method. In the diagram fig. 1, the method first described corresponds with the letters P*qkl*. The latter method with PQK'L'.

F. C. PENROSE.

ON THE CONSTRUCTION OF HOUSES FOR THE PREVENTION OF FIRES.*

STOVES are another fruitful source of mischief in private dwellings, shops, &c. A great number of fires are occasioned by these contrivances. A stove properly and securely fixed is what we have rarely met with: in almost all cases we have found them in close contact with wood-work. A stove will be placed on a wooden floor, no provision whatever being made to prevent the woodwork from being overheated. We recollect being once called upon to examine a stove which was suspected to be badly fitted up, a smell of burning wood always prevailing as soon as the heat was of considerable intensity. Suspecting the cause, we removed the stove from its place, and found the flooring beneath it quite charred and black, the ignition having been strongest in the centre: in a short time the floor would have been burnt through: a vent would thus have been created, and the consequences might have been serious. Such instances form a key to the solution of many mysterious fires. If a sheet of iron is placed beneath the stove, or if it is made to stand on an iron tray, it is thought that sufficient preventive measures have been used. In some cases, parties *particularly* careful place slates or sheet lead beneath, but this is generally the highest effort: none of these are sufficient. In stoves with a good draught, the ignition of the fuel on the bars is very rapid, and the heat thrown down on the plate beneath of considerable intensity; we have even seen lead melted in such places with facility. Moreover, servants and others will sometimes take out the burning coals, and place them on the plate: these often burn fiercely for some time, and the woodwork beneath is frequently ignited in consequence. The secure mode of setting stoves is to place them on a foundation of brick; two bricks' height will be sufficient, taking care to fill up the interstices between the bricks with fire-proof cement. If this foundation is objected to, an iron tray should be provided at least 4 inches deep, this being filled to a height of 2 inches with a cement which will harden well without cracking. The stove being placed in this, the heat thrown down will not be conducted through the cement, at least it will be so slowly conducted that the heat on the bottom plate will rarely be dangerous. Stoves should never be placed near the skirting board; this is too often done, and as if courting danger. Plates of *blackened* metal are nailed on the outside of the wood. This is done as a preventive measure, but unfortunately the contrivance is the very opposite of that which should be done: black absorbs the radiant heat thrown out by the stove. If white or polished surfaces were used, the danger would be less. While considering this, among other instances of neglect of precautionary measures in every-day business, indicated by science, we are inclined to wonder at the really little practical progress we have made in such matters. A lecturer in a scientific institution was pointing out, while noticing the phenomena of heat, the absurdity of having blackened surfaces round highly-heating stoves, at the same time that the stove in his lecture-room was furnished with these objectionable appliances. We have often thought that it was a striking commentary on the little practical good that had resulted from his *stated* prelections in that place—where arrangements were suffered to be adopted in direct opposition to the principles he made it his business to elucidate. The iron pipes attached to stoves are often the cause of fire. "When they are not in use, particularly if much soot be left in them, they attract moisture, and are rapidly oxidized; then, when they become filled with soot, and the soot takes fire, it burns fiercely, and the fire drops through the rust holes and the joints; and if these droppings of fire occur between a wainscotting, or a battening and a wall, at the hole where the pipe enters the brick flue, it is likely to set the house on fire." Great carelessness is shown in the placing of the pipes. We have seen a hole cut in a wooden partition, the iron pipe lying against it, and, in one instance, a range of pipe carried along the ceiling, in close contact with it.—a quantity of dry goods, piled *beneath*, reaching to within a very short distance of the ceiling. It is lamentable to think that such gross carelessness should be matter of every-day occurrence. If iron pipes are used, they should be made of stout metal, and when passed through apertures in a floor or lath and plaster partition, the hole should be made much larger than the outside diameter of pipe. In this aperture a short length of earthenware pipe should be inserted, the inside diameter of which should be of size sufficient to allow the iron pipe to be passed through it. The earthenware being a very slow conductor, will prevent the heat from injuring the wood-work. All pipes should be hung at least 6 inches from the roof, by means of iron brackets or staples; they should never be allowed to be in contact with the ceiling, much less carried *between the floor and ceiling*. The hazard of the latter plan is the most "imminent and unwarrantable. Say what they may of surrounding the flue with incombustible materials, no flue can be made safe within a few inches of woodwork." We see no reason why earthenware pipes should not be used for stove flues: they can be had of all diameters and all curves. There is a species of stove (much used in shops) having descending flues. They are doubtless very neat, and the absence of the flue is considered an advantage, nevertheless their use is very much to be deprecated. "Descending iron flues from open fireplaces, or cast-iron stoves set up in shops and halls, are productive of frequent firings: whether they are conducted through the flooring and along the ceiling of the room beneath to an adjacent chimney, or are carried between the joists to such chimney, or just over a wooden floor, they are full of danger." Such is the opinion of one who has extensive experience in connection with the subject.

Great attention should be paid to the internal gas-fittings in houses: brackets, projecting from chimney-pieces, are prolific sources of mischief: they are made to swing round (sometimes in a large circle), and can be easily put in contact with the wall. We have seen in many houses the paper thereon burnt a long way up, in consequence of the gas jet, when lit, having been placed too near the wall. In bed-rooms, wall brackets should never be used, especially long ones, which can be taken near the bed. Gas wall brackets should in all cases have a strong glass shade covering the flame, or a wire guard may be attached near the jet, of some two or three inches diameter, so that the light, unprotected, cannot possibly get nearer the wall or woodwork by at least a distance equal to the radius of the guard.

That the defects we have pointed out are of no trifling moment, a brief thought will suffice to show. It has not been our purpose to prove that fireplaces and stoves are necessarily attended with danger, but rather to cause our readers to think for themselves, while pointing out defective arrangements,—to make them understand the causes of danger, so that they may set to work, and find out simple means by which the lamentable effects may be entirely obviated. The subject is one to which the public attention generally is now directed; they have been content to leave the matter hitherto in the hands of the builders; but this state of affairs is dying fast away, and it is but fair and right that all parties interested in building should give their earnest attention to the subject. "A very slight effort of memory will revive the names of noble mansions, of noted public buildings, and of large manufactories, which have been entirely destroyed," by some one or other of the foregoing causes. "The lamentable conflagration of Buchan-House, the splendid mansion of the Duke of Montrose, in Loch Lomond, is ascribed to the circumstance of an oaken window lintel having been too near one of the flues. * * * Besides the houses actually destroyed, many make wonderful escapes, indeed no one can say, at at any time, that his house is not in progress of ignition. Within the fabric of its walls fire may be working its way silently and unobserved. Lately, in the course of certain repairs in Glamorgan-house, Peeblesshire, a beam of timber, charred and half burnt, was discovered in connection with the kitchen chimney: that it had not when burning set fire to the whole edifice is matter for extreme surprise. We have also heard, that in the case of some late alterations at Gore-house, in Lanarkshire, the fine modern mansion of Mr. Cranstoun, beams of timber were removed in a state half consumed by fire. It is really too bad that builders should exercise so little care in matters of such very serious concern."

A superficial observer would be inclined to think, judging from the lamentably little progress we have made in connection with the subject, that the promulgation of plans to insure fireproof construction has been of recent introduction. This, however, has not been the case. In 1748 Dr. Halls made several experiments with a view to render flooring fireproof. He caused a layer of earth to be laid on a board half an inch deep: a fire was maintained and kept in fierce ignition for two hours before the board was burnt through: the thickness of earth was one inch. This plan it is obvious was attended with many disadvantages; nevertheless it was important, inasmuch as it proved the benefit to be derived from employing non-conducting substances,—the leading feature, be it observed, of all succeeding plans. In 1775 Mr. Hartley was very successful in his experiments. His plan was nailing plates of thin iron on the joists, at their upper side, the edges being folded over, lapped and hammered close. The floors, staircases, &c., were protected in the same way: the expense of the plan when extended through a building he estimated about 5 per cent. This plan is worthy of consideration; no invention, however faulty, is totally worthless; it may have the good effect of setting people thinking, which is but the prelude to further improvements. The plan published by the Earl of Stanhope is calculated to be of eminent service to parties who are willing to attain knowledge on this important point. It was the first attempt at a complete system, so far as we are aware, and, independently of its inherent merits, it was valuable on this account—it has furnished many with extremely valuable hints. The plan may be briefly described. The principal part is what he terms under-flooring. The sides of the joists and main timbers are covered with laths of oak or fir, some quarter of an inch thick; the sides are to be completely covered, with the exception of a part 1½ inch deep near the top; this will make a ledge or projection on each side of the joist: before fixing the laths, the joists are to be covered with a coating of rough plaster hereafter described; pieces of laths are then cut, of length sufficient to go between the spaces of the joists, the ends lying on the ledges previously mentioned; these short pieces are to be laid close to one another, thus forming a kind of flooring, the bottom of which is 1½ inch from the top of the joists, the intervals occurring between each being thus filled up: the ends of the cross pieces are to be deeply laid in the rough mortar, but not nailed as the other longitudinal laths are. On the top of this lath flooring, thus made between each pair of beams, a layer of the rough mortar is to be laid; this is to come up flush with the top of the joists. In a day or two, when somewhat hardened, the mortar is to be laid with a trowel home to the sides of the beams, taking care to allow none of it to be opened on the top edges. The method of double under-flooring is by spreading a thin layer of the rough mortar on the lath foundation, then pieces of lath, the same length as those under, are imbedded in the mortar while soft; then a

* See page 343 *ante*.